PB-242 134

# IMPLEMENTATION PLAN REVIEW FOR RHODE ISLAND AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT

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# IMPLEMENTATION PLAN REVIEW

# FOR

# RHODE ISLAND

## AS REQUIRED

## BY

## THE ENERGY SUPPLY

## AND

## ENVIRONMENTAL COORDINATION ACT

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Section IV of the Energy Supply and Environmental Coordination Act of 1974, (ESECA) requires EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interferring with the attainment and maintenance of the national ambient air quality standards. This document, which is also required by Section IV of ESECA, is EPA's report to the State indicating where regulations might be revised

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# FOR

# RHODE ISLAND

# AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT


PREPARED BY THE FOLLOWING TASK FORCE:

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April 1975

RHODE ISLAND

ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT
(SECTION IV - STATE IMPLEMENTATION PLAN REVIEW)

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# 1.0 EXECUTIVE SUMMARY

The enclosed report is the U.S. Environmental Protection Agency's (EPA) response to Section IV of the Energy Supply and Environmental Coordination Act of 1974 (ESECA). Section IV requires EPA to review each State Implementation Plan (SIP) to determine if revisions can be made to control regulations for stationary fuel combustion sources without interfering with the attainment and maintenance of the National Ambient Air Quality Standards (NAAQS). In addition to requiring that EPA report to the State on whether control regulations might be revised, ESECA provides that EPA must approve or disapprove any revised regulations relating to fuel burning stationary sources within three months after they are submitted to EPA by the States. The States may, as in the Clean Air Act of 1970, initiate State Implementation Plan revisions; ESECA does not, however, require States to change any existing plan.

Congress has intended that this report provide the State with information on excessively restrictive control regulations. The intent of ESECA is that SIP's, wherever possible, be revised in the interest of conserving low sulfur fuels or converting sources which burn oil or natural gas to coal. EPA's objective in carrying out the SIP reviews, therefore, has been to try to establish if emissions from combustion sources may be increased. Where an indication can be found that emissions from certain fuel burning sources can be increased and still attain and maintain NAAQS, it may be plausible that fuel resource allocations can be altered for "clean fuel savings" in a manner consistent with both environmental and national energy needs.

In many respects, the ESECA SIP reviews parallel EPA's policy on clean fuels. The Clean Fuels Policy has consisted of reviewing implementation plans with regards to saving low sulfur fuels and, where the primary sulfur dioxide air quality standards were not exceeded, to encourage States to either defer compliance regulations or to revise the $SO_2$ emission regulations. The States have also been asked to discourage large scale shifts from coal to oil where this could be done without jeopardizing the attainment and maintenance of the NAAQS.

To date, EPA's fuels policy has addressed only those States with the largest clean fuels saving potential. Several of these States have or are currently in the process of revising $SO_2$ regulations. These States are generally in the Eastern half of the United States. ESECA, however, extends the analysis of potentially over-restrictive regulations to all 55 States and territories. In addition, the current reviews address the attainment and maintenance of all the National Ambient Air Quality Standards.

There are, in general, three predominant reasons for the existence of overly restrictive emission limitations within the State Implementation Plans. These are (1) The use of the example region approach in developing State-wide air quality control strategies; (2) the existence of State Air Quality Standards which are more stringent than NAAQS; and (3) the "hot spots" in only part of an Air Quality Control Region (AQCR) which have been used as the basis for controlling the entire region. Since each of these situations affect many State plans and in some instances conflict with current national energy concerns, a review of the State Implementation Plans is a logical follow-up to EPA's initial appraisal of the SIP's conducted in 1972. At that time SIP's were approved by EPA if they demonstrated the attainment of NAAQS or more stringent state air quality standards. Also, at that time an acceptable method for formulating control strategies was the use of an example region for demonstrating the attainment of the standards.

The example region concept permitted a State to identify the most polluted air quality control region (AQCR) and adopt control regulations which would be adequate to attain the NAAQS in that region. In using an example region, it was assumed that NAAQS would be attained in the other AQCR's of the State if the control regulations were applied to similar sources. The problem with the use of an example region is that it can result in excessive controls, especially in the utilization of clean fuels, for areas of the State where sources would not otherwise contribute to NAAQS violations. For instance, a control strategy based on a particular region or source can result in a regulation requiring 1 percent sulfur oil to be burned state-wide where the use of 3 percent sulfur coal would be adequate to attain NAAQS in some locations.

EPA anticipates that a number of States will use the review findings to assist them in making the decision whether or not to revise portions of their State Implementation Plans. However, it is most important for those States which desire to submit a revised plan to recognize the review's limitations. The findings of this report are by no means conclusive and are neither intended nor adequate to be the sole basis for SIP revisions; they do, however, represent EPA's best judgment and effort in complying with the ESECA requirements. The time and resources which EPA has had to prepare the reports has not permitted the consideration of growth, economics, and control strategy tradeoffs. Also, there have been only limited dispersion modeling data available by which to address individual point source emissions. Where the modeling data for specific sources were found, however, they were used in the analysis.

The data upon which the reports' findings are based are the most currently available to the Federal Government. However, EPA believes that the States possess the best information for developing revised plans. The States have the most up-to-date air quality and emissions data, a better feel for growth, and the fullest understanding for the complex problems facing them in the attainment and maintenance of air quality. Therefore, those States desiring to revise a plan are encouraged to verify and, in many instances, expand the modeling and monitoring data supporting EPA's findings. In developing a suitable plan, it is suggested that States select control strategies which place emissions for fuel combustion sources into perspective with all sources of emissions such as smelters or other industrial processes. States are encouraged to consider the overall impact which the potential relaxation of overly restrictive emissions regulations for combustion sources might have on their future control programs. This may include air quality maintenance, prevention of significant deterioration, increased TSP, $NO_x$ and HC emissions which occur in fuel switching, and other potential air pollution situations such as sulfates.

Although the enclosed analysis has attempted to address the attainment of all the NAAQS, most of the review has focused on total suspended particulate matter (TSP) and sulfur dioxide ($SO_2$) emissions. This is because stationary fuel combustion sources constitute the greatest source of $SO_2$ emissions and are a major source of TSP emissions.

Part of each State's review was organized to provide an analysis of the $SO_2$ and TSP emission tolerances within each of the various AQCR's. The regional emission tolerance estimate is, in many cases, EPA's only measure of the "over-cleaning" accomplished by a SIP. The tolerance assessments have been combined in Section 2 and Appendix B with other regional air quality "indicators" in an attempt to provide an evaluation of a region's candidacy for changing emission limitation regulations. In conjunction with the regional analysis, a summary of the State's fuel combustion sources (power plants, industrial sources, and area sources) has been carried out in Appendices C, D and E.

The State of Rhode Island's State Implementation Plan has been reviewed for the most prevalent causes of over-restrictive fuel combustion and emission limiting regulations. The major findings of the review are:

FOR BOTH TOTAL SUSPENDED PARTICULATES AND SULFUR DIOXIDE, THERE IS LITTLE POTENTIAL FOR REVISING FUEL COMBUSTION SOURCE EMISSION LIMITING REGULATIONS.

The supportive findings of the SIP review are as follows:

National Ambient Air Quality Standards for both suspended particulates and sulfur dioxide were exceeded in Rhode Island during 1973.

Metropolitan Providence has been proposed as an Air Quality Maintenance Area for particulate matter and sulfur dioxide.

## 2.0 STATE IMPLEMENTATION PLAN REVIEW

### 2.1 SUMMARY

A revision of fuel combustion source emissions regulations will depend on many factors. For example:

- Does the State have air quality standards which are more stringent than NAAQS?
- Does the State have emission limitation regulations for control of (1) power plants, (2) industrial sources, (3) area sources?
- Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards.
- Has the State not initiated action to modify combustion source emission regulations for fuel savings; i.e., under the Clean Fuels Policy?
- Are there no proposed Air Quality Maintenance Areas?
- Are there indications of a sufficient number of monitoring sites within a region?
- Is there an expected 1975 attainment data for NAAQS?
- Based on (1973) air quality data, are there no reported violations of NAAQS?
- Based on (1973) air quality data, are there indications of a tolerance for increasing emissions?
- Are the total emissions from stationary fuel combustion sources proportionally lower than those of other sources?
- Is there a significant clean fuels savings potential in the region?
- Do modeling results for specific fuel combustion sources show a potential for a regulation revision?

The following portion of this report is directed at answering these questions. An AQCR's potential for revising regulations increases when there are affirmative responses to the above.

The initial part of the SIP review report, Section 2 and Appendix A, was organized to provide the background and current situation information for the State Implementation Plan. Section 3 and the remaining Appendices

provide an AQCR analysis which helps establish the overall potential for revising regulations. Emission tolerance estimates have been combined in Appendix B with other regional air quality "indicators" in an attempt to provide an evaluation of a region's candidacy for revising emission limiting regulations. In conjunction with the regional analysis, a characterization of the State's fuel combustion sources (power plants, industrial sources, and area sources) has been carried out in Appendices C, D, E.

Based on an overall evaluation of EPA's current information, AQCR's have been classified as good, marginal, or poor candidates for regulation revisions. Table 2-1 summarizes the State Implementation Plan Review. The remaining portion of the report supports this summary with explanations.

TABLE 2-1

STATE IMPLEMENTATION PLAN REVIEW
(SUMMARY)

| "INDICATORS" | STATE | | Metropolitan Providence | |
|---|---|---|---|---|
| | TSP | $SO_2$ | TSP | $SO_2$ |
| • Does the State have air quality standards which are more stringent than NAAQS? | Yes | Yes | | |
| • Does the State have emission limiting regulations for control of: | | | | |
| 1. Power plants<br>2. Industrial sources<br>3. Area sources | Yes | Yes | | |
| • Did the State use an example region approach for demonstrating the attainment of NAAQS or more stringent State standards? | No | No | | |
| • Has the State not initiated action to modify combustion source emission regulations for fuel savings; i.e., under the Clean Fuels Policy? | Yes | Yes | | |
| • Are there no proposed Air Quality Maintenance Areas? | | | No | No |
| • Are there indications of a sufficient number of monitoring sites within a region? | | | Yes | Yes |
| • Is there an expected 1975 attainment date for NAAQS? | | | Yes | Yes |
| • Based on (1973) Air Quality Data, are there no reported violations of NAAQS? | | | No | No |
| • Based on (1973) Air Quality Data, are there indications of a tolerance for increasing emissions? | | | No | No |
| • Are the total emissions from stationary fuel combustion sources proportionally lower than those of other sources? | | | Yes | No |
| • Do modeling results for specific fuel combustion sources show a potential for a regulation revision? | | | No | No |
| • Is there a significant Clean Fuels Saving potential in the region? | | | No | |
| • Based on the above indicators, what is the potential for revising fuel combustion source emission limiting regulations? | | | Poor | Poor |

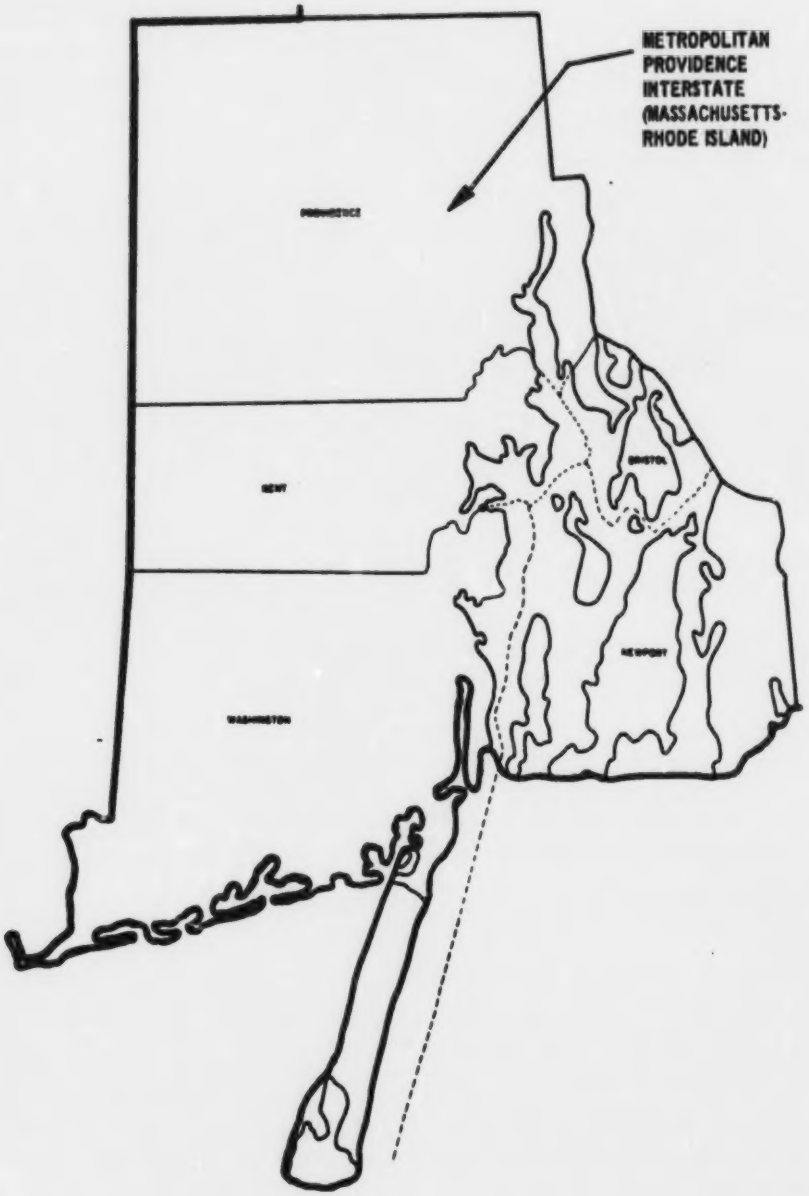


FIGURE 2-1 RHODE ISLAND PORTION OF THE METROPOLITAN PROVIDENCE INTERSTATE AIR QUALITY CONTROL REGION

## 2.2 AIR QUALITY SETTING - STATE OF RHODE ISLAND

### 2.2.1 Air Quality Control Region

The State of Rhode Island is a part of the Metropolitan Providence Air Quality Control Region, which also includes a part of Massachusetts. The pollutant priority classifications, an estimate of the 1975 population and the proposed Air Quality Maintenance Area designations for this region are shown in Table A-1.

### 2.2.2 Ambient Air Quality Standards

The State of Rhode Island has adopted ambient air quality standards for both total suspended particulates and sulfur dioxide. These standards which are shown in Table A-2, are more stringent than the Federal standards for both of these pollutants.

### 2.2.3 Air Quality Status

Air monitoring data are summarized in Tables A-4 and A-5 for suspended particulates and sulfur dioxide respectively. These data are from the SAROAD data bank as of July, 1974.

Federal ambient air quality standards were exceeded for both suspended particulates and sulfur dioxide during 1973 in the Rhode Island portion of the AQCR. The primary annual standard for both of these pollutants were exceeded, indicating that there have been sustained periods of high particulate and $SO_2$ levels. The Federal 24-hour standard for sulfur dioxide was exceeded as was the secondary standard for suspended particulates.

### 2.2.4 Emissions Summary

A summary of particulate and sulfur dioxide emissions is presented in Tables A-7 and A-8 respectively. These data are from the "1972 National Emissions Report" June, 1974 which utilizes information in the National Emissions Data System (NEDS).

Fuel combustion sources in Rhode Island account for approximately one-fourth of the region's particulate and sulfur dioxide emissions. Within Rhode Island power plants contribute only a small percentage of the particulate emissions, and about one-third of the sulfur dioxide emissions. A significant percentage of the emissions come from area source fuel combustion also.

Table A-6 is a summary of fuel combustion sources showing the number of power plants and the number of significant point sources.

## 2.3 BACKGROUND ON THE DEVELOPMENT OF THE CURRENT STATE IMPLEMENTATION PLAN

### 2.3.1 Control Strategy: Particulate Matter and Sulfur Oxides

(A) Particulate matter

Rhode Island used the Air Quality Display Model (AQDM) to demonstrate attainment of the national standards for particulate matter for the State. Realizing that approximately 50 percent of the particulate matter emisssions in Rhode Island came from refuse disposal and process losses, the State adopted an incinerator emission limiting regulation and a process weight limitation. The State also adopted a regulation which prohibited open burning on premises operated as a public or semi-public refuse disposal facility, at other central refuse disposal sites or in connection with any salvage, industrial, commercial, or institutional operation. The State indicated that a ban on all open burning was required to attain the national standards for particulate matter; therefore, they included the effect of such a limitation in their modeling effort, although they did not have a limitation of this type adopted or proposed. To determine whether Rhode Island needed a ban on all open burning to attain the national standards for particulate matter, the AQDM was rerun by EPA, excluding the effect of a ban on all open burning. The results of this new modeling clearly indicated that a limitation banning all open burning was not needed in the State of Rhode Island. Therefore, the control strategy presented in Rhode Island's plan without the ban on all open burning was recommended for approval. Rhode Island assumed that no significant population or industrial growth would occur which would effect greater emissions in the future.

(B) Sulfur oxides

An investigation of the input to the AQDM used by Rhode Island to estimate ambient air quality levels revealed various errors. EPA reran the model with the following changes which corrected the errors that significantly affected the calculated air quality concentrations. A new

regression curve for sulfur dioxide was employed, and was justified by the fact that previously a bad data point was used in determining the regression line. This bad point was disregarded and a new regresssion curve was calculated. Also, all the air quality data used to determine the regression line were representative of 0°C. These data were converted to standard conditions (25°C) to be consistent with the national standards. These new values also were used to calculate the new regression curve. The other major change was to distinguish between single stack sources and multiple stack sources. In the State modeling effort, all multiple stack sources were assumed to have only one stack with the stack parameters (exit gas velocity, exit gas temperature, stack diameter and stack height) of the actual stacks being averaged to develop stack parameters for the assumed stack.

The overall effect of the above-mentioned changes was to reduce the highest estimated concentration, after application of the State's emission limitations, to below the national standards. On the basis of the AODM modeling effort performed by EPA and the low population and industrial growth, the control strategy presented in Rhode Island's implementation plan was recommended for approval.

## 3.0 AQCR ASSESSMENTS BASED ON SIP REVIEW

The purpose of this section is to evaluate the available information for the State of Rhode Island and determine the feasibility of revisions to the SIP which would result in clean fuel conservation. The assessments will be made by addressing each type of fuel combustion source: power plants, large industrial and commercial/institutional sources, and area sources. The assessments must be made for each pollutant separately and are made on the basis of seven criteria: (1) 1973 air quality violations; (2) expected NAAQS attainment dates; (3) proposed Air Quality Maintenance Area (AQMA) designations; (4) total emissions; (5) portion of emissions from Rhode Island fuel combustion sources; (6) regional tolerance for emissions increase; and (7) pollutant priority classifications. Tables B-1 and B-2 tabulate these criteria for the AQCR for TSP and $SO_2$, respectively.

An AQCR is rated as a good, marginal, or poor candidate for regulation relaxation based on the evaluation of all the presented information. Using available data, any AQCR which displays a 1973 air quality violation would probably be given a poor ranking. Conversely, a region with no violations, no proposed AQMA designations, low to moderate emissions, a positive emission tolerance, and/or a small fraction of emissions from fuel combustion sources would receive a good ranking. A region with varying indicators or incomplete or missing data would be evaluated separately and grouped in the appropriate class, most likely a marginal ranking.

### 3.1 METROPOLITAN PROVIDENCE INTERSTATE AIR QUALITY CONTROL REGION (#120)

#### 3.1.1 Regional Air Quality Assessment

During 1973, ambient levels of total suspended particulates exceeded the Federal primary annual standard, and the secondary 24-hour standard in the Rhode Island portion of this region. (Table A-4)

Sulfur dioxide levels exceeded the Federal primary annual standard at one of the thirty-two $SO_2$ monitoring sites. The 24-hour standard was also exceeded at one site (Table A-5).

The Metropolitan Providence area including the cities listed in Table A-1 has been proposed as an Air Quality Maintenance Area for both

suspended particulates and sulfur dioxide.

This region has been rated a poor candidate for revising emission limits for either particulates or sulfur dioxide.

### 3.1.2 Power Plant Assessment

There are four Rhode Island steam electric power generating stations in this region, all of which were oil fired during 1973. The fuel sulfur content at these plants was slightly under the limits of the current regulations (Table C-1). Therefore, without switching to coal, these plants could not use a higher sulfur content fuel unless existing regulations were revised. However, a relaxation of the regulations is precluded by the fact that sulfur dioxide standards were violated in this region during 1973. It should be noted that two units at the South Street station were converted to coal during the winter (1973-1974) shortage of fuel oil.

There are some modeling results available for the South Street plant, as shown in Table C-2. With a switch to 2.0% sulfur coal, the plant under maximum load, would contribute considerably to the existing ambient $SO_2$ levels. Suspended particulate levels would also be significantly impacted indicating that a long term conversion to coal would not be feasible.

### 3.1.3 Industrial, and Commercial/Institutional Source Assessment

There are several particulate and sulfur dioxide emission sources in this region which are listed in Tables D-1 and D-2. These sources contribute a small percentage of the region's total particulate and $SO_2$ emissions. All of these sources are oil fired, representing a potential clean fuel savings although a switch to coal or higher sulfur content oil is precluded by the air quality violations in this region during 1973.

### 3.1.4 Area Source Assessment

Area source fuel combustion contributes approximately eighteen percent of the region's particulate emissions and twelve percent of the $SO_2$ emissions. Area sources account for most of the distillate oil and natural gas use in this region (Table E-1). However, there is little potential for these

sources to switch fuels because of the economic considerations in changing fuel burning equipment.

### 3.1.5 Fuel Use Summary

Fuel use data for Rhode Island are presented in Appendix E.

APPENDIX A

STATE IMPLEMENTATION PLAN BACKGROUND

TABLE A-1

RHODE ISLAND AIR POLLUTANT PRIORITY CLASSIFICATIONS

| Air Quality Control Region | Federal Number | Priority Classification[a] | | Population 1975 (Millions) | Proposed AQMA Designations For TSP And $SO_2$[b] |
|---|---|---|---|---|---|
| | | TSP | $SO_x$ | | |
| Metropolitan Providence (Mass.) | 120 | I | I | 1.6 | The cities of East Providence, Providence Central Falls, Pawtucket, Cranston, and Warwick; the town of North Providence |

[a] Criteria based on maximum measured (or estimated) pollution concentration in area:

| Priority | I | II | III |
|---|---|---|---|
| | Greater than ($\mu g/m^3$) | From - To ($\mu g/m^3$) | Less than ($\mu g/m^3$) |
| Sulfur dioxide: | | | |
| Annual arithmetic mean | 100 | 60-100 | 60 |
| 24-hour maximum | 455 | 260-455 | 260 |
| Particulate matter: | | | |
| Annual geometric mean | 95 | 60-95 | 60 |
| 24-hour maximum | 325 | 150-325 | 150 |

[b] Federal Register, July, 1974 counties showing potential for NAAQS violations due to growth.

TABLE A-2

RHODE ISLAND AMBIENT AIR QUALITY STANDARDS

All Concentrations in $\mu gms/m^3$

| | | Total Suspended Particulate | | Sulfur Oxides | | | | Nitrogen Dioxide |
|---|---|---|---|---|---|---|---|---|
| | | Annual | 24-Hour | Annual | 24-Hour | 3-Hour | 1-Hour | Annual |
| Federal (Nov. 1972) | Primary | 75(G) | 260[a] | 80(A) | 365[a] | --- | --- | 100(A) |
| | Secondary | 60(G) | 150[a] | --- | -- | 1300[a] | --- | 100(A) |
| Rhode Island | 1973 Goal | 60(G)[b] | 168[a,b] | 72(G)[b] | 358[a,b] | --- | 858[a,b] | None |
| | 1975 Goal | 50(G)[b] | 130[a,b] | 57(G)[b] | 286[a,b] | --- | 687[a,b] | None |

[a] Not to be exceeded more than once per year.

[b] Standard conditions for measurements are established at 25°C, 1 atm pressure

(A) Arithmetic Mean

(G) Geometric Mean

TABLE A-3

AIR QUALITY STANDARDS ATTAINMENT DATES
METROPOLITAN PROVIDENCE AIR QUALITY CONTROL REGION

| Particulates | | Sulfur Dioxide | |
|---|---|---|---|
| Primary | Secondary | Primary | Secondary |
| 5/75 | 5/75 | 3/75 | 3/75 |

TABLE A-4

RHODE ISLAND AIR QUALITY STATUS (1973), TSP[a]

| Air Quality Control Region | # Stations Reporting | TSP Concentration ($\mu g/m^3$) Highest Reading Annual | Highest Reading 24-Hr | 2nd Highest Reading 24-Hr | # Stations Exceeding Ambient Air Quality Standards: Primary Annual | Primary 24-Hr[c] | Secondary Annual | Secondary % | Secondary 24-Hr[c] | Secondary % | % Reduction Required to Meet Standards[d] | Standard on Which % Reduction Is Based |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Metropolitan Providence[b] | 33 | 86 | 543 | 206 | 1 | 0 | 2 | 6 | 3 | 9 | + 45 | Annual |

[a] 1973 air quality in National Air Data Bank, July 28, 1974.

[b] Interstate.

[c] Violations based on more than one reading in excess of standard

[d] Formula:

$$\left(\frac{\text{2nd Highest 24 Hr - 24 Hr Secondary Standard}}{\text{2nd Highest 24-Hr - Background}}\right) \times 100, \quad \left(\frac{\text{Annual - Annual Secondary Standard}}{\text{Annual - Background}}\right) \times 100$$

Background: $28 \mu g/m^3$

TABLE A-5

RHODE ISLAND AIR QUALITY STATUS (1973), $SO_2$[a]

| Air Quality Control Region | # Stations Reporting (24-Hr Bubbler) | # Stations Reporting (Contin.) | $SO_2$ Concentration ($\mu g/m^3$) Highest Reading Annual | Highest Reading 24-Hr | 2nd Highest Reading 24-Hr | # Stations Exceeding Ambient Air Quality Stds. Primary Annual | Primary 24-Hr[c] | Secondary 3-Hr | % Reduction[d] Required To Meet Standards | Standard on Which % Reduction Is Based |
|---|---|---|---|---|---|---|---|---|---|---|
| Metropolitan Providence[b] | 28 | 4 | 100 | 620 | 464[e] | 1 | 1 | - | +21 | 24-Hour |

[a] 1973 air quality data in National Air Data Bank, July 28, 1974.

[b] Interstate.

[c] Violation based on 2nd highest reading at any station.

[d] Formula: $\left(\frac{\text{2nd Highest 24-Hr - 24-Hr Standard}}{\text{2nd Highest 24-Hr}}\right) \times 100$, $\left(\frac{\text{Annual - Annual Standard}}{\text{Annual}}\right) \times 100$

[e] Data provided by State.

TABLE A-6

RHODE ISLAND FUEL COMBUSTION SOURCE SUMMARY

| Air Quality Control Region | AQCR No. | Power Plants[a] | Other Fuel Combustion Point Sources[b] | | Area Sources | Total Emissions ($10^3$ Tons/Year)[d] | | % Emissions From Rhode Island Fuel Combustion Sources | |
|---|---|---|---|---|---|---|---|---|---|
| | | | TSP | $SO_2$ | | TSP | $SO_2$ | TSP | $SO_2$ |
| Metropolitan Providence | 120[e] | 4 | 11[g] | 30[f] | c | 36.6 | 241.3 | 24 | 29 |

[a] Rhode Island power plants only

[b] Rhode Island industrial and commercial/institutional sources in addition to power plants

[c] Entire State of Rhode Island

[d] AQCR total

[e] Interstate region

[f] All significant point sources, when combined with power plants, contribute more than 90% of the total $SO_2$ emissions from fuel combustion point sources

[g] All significant point sources, when combined with power plants, contribute more than 70% of the total TSP emissions from fuel combustion point sources

TABLE A-7

RHODE ISLAND PARTICULATE EMISSIONS SUMMARY[a]

| Air Quality Control Region | Total ($10^3$ Tons/yr) | % | Electricity Generation ($10^3$ Tons/yr) | % | Point Source Fuel Combustion[b] ($10^3$ Tons/yr) | % | Area Source Fuel Combustion ($10^3$ Tons/yr) | % |
|---|---|---|---|---|---|---|---|---|
| Metropolitan Providence | | | | | | | | |
| Rhode Island Portion | 14.4 | 54 | 0.5 | 3 | 1.2 | 8 | 4.8 | 33 |
| Mass. Portion | 12.2 | 46 | 2.5 | 20 | 0.8 | 7 | 3.8 | 31 |
| Total | 26.6 | 100 | 3.0 | 11 | 2.0 | 8 | 8.6 | 32 |

[a]Source: 1972 National Emissions Report, EPA, June 1974.

[b]Excludes emissions from electricity generation.

TABLE A-8

RHODE ISLAND SULFUR DIOXIDE EMISSIONS SUMMARY[a]

| Air Quality Control Region | Total ($10^3$ Tons/yr) | % | Electricity Generation ($10^3$ Tons/yr) | % | Point Source Fuel Combustion[b] ($10^3$ Tons/yr) | % | Area Source Fuel Combustion ($10^3$ Tons/yr) | % |
|---|---|---|---|---|---|---|---|---|
| Metropolitan Providence | | | | | | | | |
| Rhode Island Portion | 72.5 | 30 | 23.6 | 33 | 17.5 | 24 | 29.4 | 41 |
| Mass. Portion | 168.8 | 70 | 129.2 | 77 | 4.4 | 3 | 33.6 | 20 |
| Total | 241.3 | 100 | 152.8 | 63 | 21.9 | 9 | 63.0 | 26 |

[a]Source: 1972 National Emissions Report, EPA, June 1974.

[b]Excludes emissions from electricity generation.

TABLE A-9

RHODE ISLAND PARTICULATE EMISSION
REGULATION FOR FUEL BURNING EQUIPMENT

| Heat Input[a,b] | Maximum Allowable[c] |
|---|---|
| Greater than 1, but less than 250 | 0.20 |
| Greater than 250 | 0.10 |

a - Heat input is the aggregate heat content of all fuels whose product of combustion pass through a single stack or stacks.

b - $10^6$ BTU/hour

c - lbs/$10^6$ BTU of heat input

TABLE A-10

RHODE ISLAND SULFUR CONTENT
OF FUELS REGULATION

| Existing | Proposed |
|---|---|
| 1.0[a] | 0.55[b,c] |

a - Sulfur content - Percent by weight.

b - Maximum allowable, lb/$10^6$ BTU heat release potential.

c - Coal use only, fuel oil would remain same as existing regulation.

# APPENDIX B

## REGIONAL AIR QUALITY SUMMARY

TABLE B-1

REGIONAL INDICATORS FOR REVISION OF TSP REGULATIONS

| AQCR Name | AQCR No. | No. of Stations | | Expected Attainment Date | Any Proposed AQMA Designations? | Total Emissions ($10^3$ Tons/Year) | % Emission From R. I. Fuel Combustion | Percent Tolerance For Emissions Increase |
|---|---|---|---|---|---|---|---|---|
| | | Reporting | Violating Standards | | | | | |
| Metropolitan Providence | 120[a] | 33 | 6 | 5/75 | Yes[b] | 36.6 | 24 | -45 |

[a] Interstate region.

[b] Refer to Table A-1.

TABLE B-2

REGIONAL INDICATORS FOR REVISION OF $SO_2$ REGULATIONS

| AQCR Name | AQCR No. | No. of Stations Reporting | No. of Stations Violating Standards | Expected Attainment Date | Any Proposed AQMA Designations? | Total Emissions ($10^3$ Tons/Year) | % Emission From R.I. Fuel Combustion | Percent Tolerance For Emissions Increase |
|---|---|---|---|---|---|---|---|---|
| Metropolitan Providence | 120[a] | 32 | 2 | 3/75 | Yes[b] | 241.3 | 29 | - 20 |

[a]Interstate region.

[b]Refer to Table A-1.

APPENDIX C

POWER PLANT SUMMARY

TABLE C-1

RHODE ISLAND POWER PLANTS

| Plant Name | 1975 Capacity (MW) | 1973 Fuel Use[a] Type | %S | Quantity[b] | % Sulfur by Regulation | Boiler also Designed for Coal? |
|---|---|---|---|---|---|---|
| Manchester Street Narragansett Elec. Co. | 148.0 | Oil | 0.93 | 1191 | 1.0 | Yes |
| South Street Narragansett Elec. Co. | 145.9 | Oil | 0.95 | 1195 | 1.0 | Yes |
| W. Howard Street Newport Elec. Co. | 10.5 | Oil | NA | 120[c] | 1.0 | No |
| Pawtucket Blackstone Valley Elec. | 33.5 | Oil | NA | 2.5[d] | 1.0 | No |
| | | Natural Gas | - | 21 | | |

[a]Data from Federal Power Commission.

[b]Oil quantity is in $10^3$ barrels, natural gas is in $10^6$ cubic feet.

[c]1972 Fuel Use Data, Source: Steam Electric Plant Factors, 1973. National Coal Association

[d]FY 1973 Fuel use.

TABLE C-2

SUMMARY OF POWER PLANT MODELING RESULTS[a]

Maximum 24-Hour Concentration ($\mu g/m^3$)

| Plant | $SO_2$ | | Particulates | | Maximum Annual Concentration ($\mu g/m^3$) | |
|---|---|---|---|---|---|---|
| | Nominal Load | Maximum Load | Nominal Load | Maximum Load | $SO_2$ | Particulates |
| South Street | | | | | | |
| 1972 Operations[b] | 62 | 135 | 4 | 7 | 7 | <1 |
| Switch Units[c] (121/122) | 97 | 219 | 26 | 39 | 3 | 1 |



[a]Source: Modeling Analysis of Power Plants for Fuel Conversion (Group IV), Walden Research, Sept. 12, 1974

[b]0.9% sulfur oil

[c]Switch to 2.0% coal

## APPENDIX D

## INDUSTRIAL, COMMERCIAL/INSTITUTIONAL SOURCE SUMMARY

### TABLE D-1
### RHODE ISLAND INDUSTRIAL AND COMMERCIAL/INSTITUTIONAL SIGNIFICANT TSP SOURCES

| County | Name | Fuel | Boiler Design Capacity(a)[f] | Quantity[b] |
|---|---|---|---|---|
| Newport | U.S. Navy Base[c] | Oil | 75(3) | 2713 |
| | | Oil | 125 | 1590 |
| | | Oil | 63 | 804 |
| | | Oil | 100(2) | 3880 |
| | | Oil | 94 | 4800 |
| | | Oil | 52 | 4150 |
| Providence | Corning Glass | Oil | 35 | 3045 |
| | | NG | d | 577 |
| | Atlantic Tubing & Rubber | Oil | 130 | 3000 |
| | Grinnell Corp. | Oil | 13 | 1460 |
| | Naragansett Brewing | Oil | 150 | 955 |
| | | Oil | 100 | 3770 |
| | | NG | d | 480 |
| | Bird & Son | Oil | 125 | 5490 |
| | | Oil | 50 | 1620 |
| | Washburn Wire | Oil | 100 | 5100 |
| | Brown University | Oil | 125 | 2325 |
| | | NG | d | 10 |
| | Uniroyal, Inc. | Oil | 150 | 3840 |
| Washington | U.S. Navy Air Station | Oil | 81(4) | 7880 |
| | | Oil | 406[e] | 1640 |
| | Univ. of Rhode Island | Oil | 158 | 2850 |

a - Number of boilers.

b - Oil in $10^3$ gallons, natural gas in $10^6$ cubic feet, NEDS data.

c - Includes four plant ID's at same UTM coordinates.

d - Secondary fuel.

e - Space heaters.

f - $10^6$ BTU/hr.

TABLE D-2

RHODE ISLAND INDUSTRIAL AND COMMERCIAL/INSTITUTIONAL
SIGNIFICANT $SO_2$ SOURCES

| County | Name | Fuel | Boiler Design Capacity(a)[f] | Quantity[b] |
|---|---|---|---|---|
| Bristol | Kaiser Aluminum | Oil | 108 | 2040 |
| Kent | American Hoechst | Oil | 18(2) | 898 |
| | | Oil | 26 | 1130 |
| | | Oil | 38 | 190 |
| | Arkwright Interlacken | Oil | 96 | 1040 |
| | Pawtucket Val Dying | Oil | 72 | 1120 |
| | Leasona | Oil | 24 | 770 |
| | Leviton Mfg. | Oil | 38 | 901 |
| Newport | U.S. Navy Base[c] | Oil | 75(3) | 2713 |
| | | Oil | 125 | 1590 |
| | | Oil | 63 | 804 |
| | | Oil | 100(2) | 3880 |
| | | Oil | 94 | 4800 |
| | | Oil | 52 | 4150 |
| Providence | Corning Glass | Oil | 35 | 3045 |
| | | N.G. | d | 577 |
| | Atlantic Tubing & Rubber | Oil | 130 | 3000 |
| | Grinnell Corp. | Oil | 13 | 1460 |
| | Narragansett Brewing | Oil | 150 | 955 |
| | | Oil | 100 | 3770 |
| | | N.G. | d | 480 |
| | Bird & Son | Oil | 125 | 5490 |
| | | Oil | 50 | 1620 |
| | Mobil Oil Co. | Oil | 21(5) | 6400 |
| | Washburn Wire | Oil | 100 | 5100 |
| | Stamina Mills | Oil | 17 | 801 |
| | American Ins. Wire | Oil | 36 | 912 |
| | Memorial Hospital | Oil | 28 | 712 |
| | Teknor Apex | Oil | 30 | 1200 |
| | Brown University | Oil | 125 | 2325 |
| | | N.G. | d | 10 |
| | Narragansett Improvement | Oil | 151 | 900 |

TABLE D-2 (cont.)

| County | Name | Fuel | Boiler Design Capacity(a)[f] | Quantity[b] |
|---|---|---|---|---|
| Providence (cont.) | R. I. Hospital | Oil | 178 | 1500 |
| | Uniroyal, Inc. | Oil | 150 | 3840 |
| | Enterprise Dye | Oil | 37 | 835 |
| | Davol Rubber | Oil | 13 | 800 |
| | | Oil | 28 | 400 |
| Washington | Bradford Dyeing | Oil | 338 | 6100 |
| | U. S. Navy Air Station | Oil | 81(4) | 7880 |
| | | Oil | 406[e] | 1640 |
| | University of Rhode Island | Oil | 158 | 2850 |
| | Point Judith By-Products | Oil | 25 | 914 |
| | Kenyon Piece Dyeworks | Oil | 13 | 457 |
| | | Oil | 25 | 914 |

[a] Number of boilers

[b] Oil in $10^3$ gallons, natural gas in $10^6$ cubic feet, NEDS data.

[c] Includes four plant ID's at same VMT coordinates

[d] Secondary fuel for above boiler(s)

[e] 347 space heaters

[f] $10^6$ BTU/Hr

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# APPENDIX E

## FUEL USE SUMMARY

### TABLE E-1
### FUEL USE SUMMARY[a]

| | Coal ($10^3$ Tons) | | Oil ($10^3$ Gallons) | | Gas ($10^6$ Cu. Ft.) | |
|---|---|---|---|---|---|---|
| | Anthracite | Bituminous | Residual | Distillate | Natural | Process |
| Area Sources | 3.8 | 7.4 | 214.7 | 348.6 | 22,010 | 0 |
| Point Sources | 0 | 2.7 | 229.5 | 1.8 | 5,666 | 0 |
| Total | 3.8 | 10.1 | 444.2 | 350.4 | 27,676 | 0 |

a - Source: Stationary Source Fuel Summary Report, NEDS, November 1974. Data are for Rhode Island portion of AQCR only.